

## REMARKS

These Remarks are in reply to the Office Action mailed December 19, 2005. Claims 1-22 were pending in the Application prior to the outstanding Office Action. Claims 1, 5, 6, 9, 11, 12, 16, 18 and 20-22 are being amended, claims 4 and 15 are being canceled, and new claims 23-25 are being added. Claim 1-3, 5-14 and 16-25 remain pending, with claims 1, 5, 10, 11, 12, 16, 18 and 25 being independent. Based on the above amendments and the following remarks, Applicant respectfully requests reconsideration and withdrawal of the outstanding objections and rejections.

### I. Summary of Office Action

Claims 1-3, 5, 10-15 and 18-22 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 5,414,280 to Girmay (hereafter "Girmay").

Claims 4, 6-9, 16 and 17 were objected to for being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### II. Discussion of Claims

**Claim 1** has been amended to include the features of allowable claim 4. Accordingly, claim 1 and its dependent claims 2 and 3 should now be in condition to be allowed.

**Claim 5** has been amended to be in independent form. For the convenience of the Examiner, claim 5 as amended is reproduced below.

5. *For use in a system including a power supply that provides a supply voltage to a laser driver, and a laser diode that receives a drive current from the laser driver, a method for reducing power consumption, comprising:*

(a) *monitoring a voltage drop across the laser diode;*

*(b) determining a desired supply voltage, based on at least both the monitored voltage drop across the laser diode and a laser driver headroom voltage, the laser driver headroom voltage being at least a minimal additional voltage necessary to operate the laser driver; and*

*(c) adjusting the supply voltage to generally track the desired supply voltage.*

While Girmay may monitor a voltage drop across a laser diode, Applicant asserts that Girmay does not teach or suggest steps (b) and (c) of claim 5. It was asserted in the Office Action that these steps are taught at column 1, lines 56-59 and column 2, lines 15-20 of Girmay. For at least the following reasons, Applicant respectfully disagrees.

Column 1, lines 56-59 states that the voltage drop across the laser diode is used as a measure of the diode output power. Column 2, lines 15-20 explains that a difference between a predetermined level and the actual power, as detected by a photodetector, is fed back to control the voltage, and that voltage is then used to control the current, so that the laser diode power matches the required level. In other words, Girmay adjusts a voltage (that is used to control a current) so that an output power of a laser diode remains at a constant predetermined level.

Step (b) of claim 5 is “determining a desired supply voltage, based on at least both the monitored voltage drop across the laser diode and a laser driver headroom voltage, the laser driver headroom voltage being at least a minimal additional voltage necessary to operate the laser driver”. The “monitored voltage drop” across the laser diode, as determined at step (a), is dynamic (i.e., changes over time) due to the changing age and/or changing temperature of the laser diode, as explained in paragraphs [0021]-[0025] of the specification. Accordingly, the “desired supply voltage” as determined at step (b) is also dynamic, since it is based at least in part on the monitored voltage drop.

In contrast, the so called “desired power” in Girmay “is set to a predetermined level”, as explained in column 2, line 15 of Girmay. Referring to FIGS. 1 and 5 of Girmay, the “desired power” is represented by the arrow labeled “EXPOSURE +” which

is pointing into the summing junction 13. Still referring to FIGS. 1 and 5, while Girmay does monitor the voltage drop across the laser diode 10, it is clear that Girmay is not determining the “desired power” based on the voltage drop across the laser diode 10. Rather, Girmay is using the voltage drop across the laser diode 10 to create a correction current that is used to keep the output of the laser diode constant, as described in detail above. Accordingly, Girmay does not perform the step of “determining a desired supply voltage, based on at least both the monitored voltage drop across the laser diode and a laser driver headroom voltage”, as required by claim 5.

Step (c) of claim 5 is “adjusting the supply voltage to generally track the desired supply voltage”. In other words, in step (c) the supply voltage, which powers the laser driver (that drives the laser diode), is adjusted to track the dynamic desired supply voltage determined at step (b).

In contrast, Girmay adjusts a voltage so that the output power of the laser diode remains at a constant desired predetermined power level. Referring again to FIGS. 1 and 5 of Girmay, Girmay is trying to keep the power produced by the laser diode at a constant level specified by the arrow labeled “EXPOSURE +” which is pointing into the summing junction 13. Accordingly, Girmay does not perform the step of is “adjusting the supply voltage to generally track the desired supply voltage”, as required by claim 5.

The above described differences between Girmay and the invention of claim 5 are expected, since the purpose of the invention of claim 5 and the purpose of Girmay are completely different. Girmay appears to be attempting to maintain the light intensity output of a laser diode at a predetermined desired level to maintain a desired contrast in pixels (of a display) being turned ON and OFF by the laser diode.

In contrast, the purpose of the invention of claim 5 is to reduce (and preferably minimize) power consumption in a system, such as an optical storage device, that includes a power supply that provides a supply voltage to a laser driver, which provides a drive current to a laser diode. Conventionally, the voltage supply used to power the laser driver is set with the worst case laser diode forward voltage in mind (i.e., the case where the laser diode is old and hot), as explained in paragraph [0021] of the present application. Setting the voltage supply, with the worst case in mind, wastes significant power, especially when the laser diode is young and/or cold. In the invention of claim 5,

the supply voltage varies dynamically according to the dynamic voltage requirement of the laser diode, so as to reduce (and preferably minimize) power consumption.

For at least the reasons discussed above, Applicant respectfully asserts that Girmay does not anticipate claim 5 because Girmay does not teach steps (b) and (c) of claim 5. Accordingly, Applicant respectfully requests that the 102(b) rejection of claim 5 be reconsidered and withdrawn.

**Claims 6-9** – Applicant thanks the Examiner for indicating that claims 6-9, which depend from claim 5, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Because Applicant believes that base claim 5 is patentable, Applicant respectfully asserts that claims 6-9 need not be redrafted to be allowed.

**Claim 10** requires “a controller to determine desired supply voltage information based on at least both a laser driver headroom voltage and voltage samples produced by the sampler; wherein the controller also provides the desired supply voltage information to either a power supply that produces an actual supply voltage used to power the laser driver, or to a further controller associated with the power supply.” It was asserted in the Office Action that the circuit in FIG. 5 of Girmay teaches such a controller. For at least the the following reasons, Applicant respectfully disagrees.

Applicant is not contending that it is unique for a laser driver to have an associated laser driver headroom voltage. However, Applicant asserts that it is unique for a controller to “determine desired supply voltage information based on at least both a laser driver headroom voltage and voltage samples produced by the sampler”, as required by claim 10.

While Girmay uses a sample-and-hold to sample a voltage drop across a laser diode, Girmay does not “determine desired supply voltage information based on at least both a laser driver headroom voltage and voltage samples”, as required by claim 10. Rather, Girmay uses the voltage samples (produced by the sample-and-hold) to maintain the light intensity output of the laser diode at a predetermined desired level.

Further, Applicant asserts that Girmay does not teach or suggest that “the controller also provides the desired supply voltage information to either a power supply that produces an actual supply voltage used to power the laser driver, or to a further controller associated with the power supply” as required by claim 10.

Accordingly, Applicant respectfully request that the 102(b) rejection of claim 10 be reconsidered and withdrawn. If the Examiner is to maintain the rejection of claim 10, Applicant respectfully request that the Examiner explain in more detail how Girmay teaches the above mentioned features of claim 10.

**Claim 11** – The system of claim 11, as amended, includes “a controller to adjust a supply voltage, used to power the laser driver, based at least in part on voltage drop samples produced by the sampler, wherein the controller increases the supply voltage when the voltage drop samples are indicative of an increase in the voltage drop across the laser diode, and the controller decreases the supply voltage when the voltage drop samples are indicative of a decrease in the voltage drop across the laser diode.” Applicant asserts that claim 11 should be allowable for at least the reason that claim 11 includes features similar to those in original claim 4, which the Examiner had indicated as being allowable.

**Claim 12**, as amended, includes “a controller to adjust a supply voltage, used to power the laser driver, based on at least both a laser driver headroom voltage and voltage drop samples produced by the sampler, to substantially minimize the amount of power consumed by the laser driver and laser diode.” As explained above, with reference to claim 5, Girmay adjusts a voltage so that an output power of a laser diode remains at a desired predetermined power level. There is no teaching or suggestion that Girmay is trying to reduce power consumption. Rather, Girmay is attempting to maintain the light intensity output of a laser diode at a constant predetermined desired level to maintain a desired contrast in pixels (of a display) that are being turned ON and OFF by the laser diode.

For at least the reason that Girmay does not teach the features of the controller of claim 12 as amended, Applicant respectfully requests that the 102(b) rejection of claim 12, and its dependent claims 13-15, be reconsidered and withdrawn.

**Claim 16** was indicated as being allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims. Applicant has rewritten claim 16 as suggested. Accordingly, Applicant respectfully requests that claim 16, and its dependent **claim 17**, be allowed

**Claim 18**, as amended, is reproduced below for the convenience of the Examiner.

18. *A system, comprising:*

*a laser driver adapted to drive a laser diode; and*

*a controller to monitor a voltage drop across the laser diode and*

*to determine a desired supply voltage based at least in part on the monitored voltage drop;*

*wherein the controller also adjusts a supply voltage, which powers the laser driver, to track the desired supply voltage.*

For reasons similar to those explained above in the discussion of step (b) of claim 5, Applicant respectfully asserts that Girmay does not teach or suggest “a controller to monitor a voltage drop across the laser diode and to determine a desired supply voltage based at least in part on the monitored voltage drop”, as required by claim 18.

For reasons similar to those explained above in the discussion of step (c) of claim 5, Applicant respectfully asserts that Girmay does not teach or suggest that the controller “adjusts a supply voltage, which powers the laser driver, to track the desired supply voltage”, as also required by claim 18.

Accordingly, Applicant respectfully requests that the 102(b) rejection of claim 18, and its dependent claims 19-22, be reconsidered and withdrawn.

**Claims 23-24** – Applicant respectfully asserts that new claim 23 is patentable over Girmay for reasons similar to those discussed above with reference to claim 5. Additionally, Applicant asserts that claim 24 is patentable for at least the reason that it depends from claim 23, and because it includes features similar to those original claim 9, which was indicated as being allowable.

**Claim 25** – New claim 25 depends from claim 10. Applicant asserts that new claim 25 is patentable for at least the reason that it depends from claim 10. Further, Applicant asserts that claim 25 is patentable for the specific features that it adds, which are similar to those in original claim 9, which was indicated as being allowable.

### **III. Conclusion**

In light of the above, it is respectfully requested that all outstanding rejections and objections be reconsidered and withdrawn. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response which may be required.

Respectfully submitted,

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